Claims

1. A method of preparing a metathesis catalyst, the method including the steps of:

mixing an aqueous solution of transition metal anions having a pH of 9 or higher with a carrier; and

removing water from the mixture by means of evaporation.

2. A method as claimed in Claim 1, wherein the carrier is silica and the transition metal is tungsten.

3. A method as claimed in Claim 2, wherein the aqueous solution contains tungsten in the form of ammonium metatungstatehydrate and/ or ammonium tungstate.

4. A method as claimed in Claim 3, wherein the aqueous solution contains tungsten in the form of ammonium metatungstatehydrate and wherein the concentration of the ammonium metatungstatehydrate and the mass of the silica are selected such that the WO_3 on the SiO_2 is from 4 to 10 wt%.

5. A method of preparing a metathesis catalyst as claimed in any one of claims 1 to 4, wherein excess water is removed by evaporation at about 80°C under reduced pressure to form a residue.

6. A method of preparing a metathesis catalyst as claimed in Claim 5, wherein further water is removed after removal of the excess water by drying the residue at about 110°C for about 12 hours, then by raising the temperature at a rate of about 1°C every minute up to about 250°C, maintained at about 250°C for about two hours and then by raising the temperature at a rate of about 3°C every minute up to about 550°C.

7. A method of preparing a metathesis catalyst as claimed in Claim 6, wherein the residue is then calcined.

8. A method of preparing a metathesis catalyst as claimed in Claim 7, wherein the residue is calcined at about 550°C for about 8 hours.

9. A method of preparing a metathesis catalyst as claimed in Claim 7, wherein the residue is calcined at a temperature and for duration such that the calcination step substantially removes NH_3, ensures that the oxidation state of the tungsten is mostly 6+ and ensures that the tungsten oxide is bound to the carrier.

10. A catalyst for metathesis of an olefinic feed stream, which includes:

a transistion metal oxide; and

a carrier, the transition metal oxide being deposited onto the carrier from an aqueous solution of transition metal oxide anions at a pH of 9 or more.

11. A catalyst as claimed in Claim 10, wherein the transition metal is tungsten and the carrier is silica.

12. A catalyst as claimed in Claim 10 or Claim 11, wherein the catalyst is a heterogeneous catalyst.

13. A catalyst as claimed in Claim 11 or Claim 12, wherein most of the tungsten oxide deposits are substantially amorphous.

14. A catalyst as claimed in any one of claims 11 to 13, wherein the catalyst is characterised in that at least a portion of some of the tungsten oxide deposits are in the form crystallites of less than about 135 Å across on the surface of the carrier.

15. A catalyst as claimed in any one of the claims 11 to 14, wherein the tungsten oxide is from about 4 to 10 wt% on SiO_2.

16. A catalyst as claimed in any one of the claims 11 to 15, wherein the catalyst is characterised in that it remains catalytically active for at least 1000 hours at optimal operating conditions.

17. A catalyst as claimed in any one of the claims 11 to 16, wherein the catalyst is characterised in that it provides a conversion rate of at least 30% for at least 50 hours at optimal operating conditions.

18. A metathesis process, which includes the step of:

contacting a C_5 and/ or higher olefinic feed stream with a catalyst for metathesis as claimed in any one of claims 10 to 17 at a temperature of between 350°C and 600°C.

19. A metathesis process as claimed in Claim 18, wherein the process includes a step of activating the catalyst at about 500 to 700°C for about 8 hours in an inert atmosphere.

20. A metathesis process as claimed in Claim 19, wherein the olefinic feed stream is selected such that the process yields C_{10} to C_{18} olefins.

21. A metathesis process as claimed in Claim 18 or Claim 19, wherein the feed stream is contacted with the catalyst at a LHSV of between 5 and 25 h^{-1} at a temperature of between 350 and 550°C.

22. A metathesis process as claimed in any one of claims 18 to 21, wherein the feed stream is contacted with the catalyst at a pressure of 0.1 to 10 atm.

23. A catalyst for metathesis of an olefinic feed stream substantially as described herein with reference to the accompanying graphs and schemes.

24. A method of preparing a metathesis catalyst substantially as described herein with reference to the accompanying graphs and schemes.

25. A metathesis process substantially as described herein with reference to the accompanying graphs and schemes.